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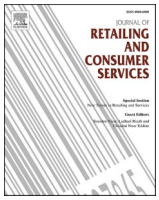

Snack dilemma: How vending machines influence choice of virtue and vice foods

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ABSTRACT

This research investigates consumer decision-making in vending machine settings, focusing on choosing between vice (less healthy) and virtue (healthier) products. The study identifies key drivers that influence purchases and explains these choices through construal-level theory. By analyzing real transaction data from 13,709 purchases, we examine how product familiarity, price, payment method, time of day, and product placement affect consumer behavior. The results reveal that product familiarity and price significantly influence the selection of vice products. Conversely, placing virtue products on higher rows and the right-hand side of the vending machine enhances their likelihood of being chosen. Furthermore, the context of vending machine locations, including workplaces, universities, and hospitals, uniquely shapes the dynamics between vice and virtue product choices. These findings, interpreted through construal level theory, provide actionable insights for optimizing vending machine layouts and promoting healthier consumer behaviors. Ultimately, this research contributes to retailing and public health by providing strategies to promote healthier choices in environments where vending machines are prevalent.

1. Introduction

Approximately 2.5 billion adults are overweight (World Health Organization: WHO, 2024). Excessive body weight poses serious health risks, including cardiovascular diseases and cancer, which collectively contribute to over 3 million deaths annually. Moreover, it imposes a significant financial burden on many States: healthcare costs for overweight-related conditions exceed $147 billion annually in the U.S. alone, underscoring the urgent need for ways to promote healthier eating habits. The phenomenon is exacerbated by the food industry's increased availability of ultra-processed, cheap, and effectively marketed unhealthy foods, contributing to overweight (Van Tulleken, 2023).

The retailing literature differentiates between two categories of food products: vice and virtue. Vice products are tastier but less healthy, characterized by their enticing nature, often serving as a self-reward that provides pleasure and indulgence (Vosgerau et al., 2019; Ketron et al., 2021). By contrast, virtue products are healthier choices, consumed primarily to achieve health-related benefits (Mishra and Mishra, 2011). This distinction highlights the motivations behind food choices, where immediate pleasure can often compete with long-term health-conscious decisions.

In particular, snacks are mostly ultra-processed foods (Van Tulleken, 2023). Busy lifestyles and increased snacking occasions are driving global snack sales, which surpassed USD 680 billion in retail sales in 2024, up 6 % from 2023 (Euromonitor International, 2024). However, in response to the growing trend towards healthier lifestyles and government concerns about the healthcare costs of unhealthy eating choices, a wider array of healthier options is emerging in vending machine selections (Calabro et al., 2024). For example, 60 % of individuals also consume healthy snacks, reflecting a rising trend in recent years (Innova Market Insights, 2024).

From a retailing perspective, vending machines are becoming increasingly popular in environments such as hospitals, workplaces, and schools. They provide quick access to snacks, catering to busy individuals, especially during long work hours. As a result, the vending

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machine market has seen a compound annual growth rate of 9.1 %, increasing from $44.66 billion in 2023 to $48.72 billion in 2024 (Statista, 2024a,b). This growth is fueled by a convenience-oriented culture, a demand for 24/7 accessibility, product diversification, urbanization, high foot traffic areas, cost-effective retailing, and the growing popularity of on-the-go consumption (Research and Markets, 2022). Given the significance of vending machines in distributing food products, there have been numerous calls in the literature to analyze consumers' food choices in these settings to improve consumer well-being (e.g., Benvenuti et al., 2023). However, research in this area remains limited, likely due to challenges in accessing real data and difficulties in realistically simulating such choices in experimental settings. As a result, previous studies on food products in vending machines have not been able to effectively identify the factors that influence consumer choices. Therefore, our goal is to investigate the factors that drive consumers to choose vice and virtue products in vending machines.

Vending machines stand out from other retail formats because of the unique purchasing experience they provide. Their automated and impersonal nature sets them apart from traditional retail environments, where human interaction and social dynamics play a significant role. The absence of a cashier eliminates the feeling of being judged, giving consumers the freedom to choose anonymously and reducing any guilt associated with buying indulgent items (Kivetz and Zheng, 2006). Moreover, purchases from vending machines are often spontaneous, with consumers making quick decisions with minimal thought or consideration (Jebarajakirthy et al., 2020; Peterson and Balasubramanian, 2002). The limited time and cognitive effort invested in these choices can lead to a reliance on convenience and immediate gratification, pushing consumers towards less healthy options. By contrast, traditional retail settings encourage deliberate decision-making, where consumers weigh or discuss options with sales staff. This distinction underscores the need for targeted research into vending machines, as such a retailing context can influence consumer choices and health outcomes.

We contribute to the literature in several ways. First, the retail literature acknowledges that vending machines represent a unique context where consumers' decisions might differ from those in other retail settings, such as offline and online stores, and calls for studies focusing on vending machines. However, there are few studies set in vending machine contexts. Our research therefore contributes to the literature by providing results specific to vending machines. Furthermore, most existing studies rely on self-report data (Grimmer and Miles, 2016) or experimental scenarios with few respondents (see Matthews and Horacek, 2015, for a methodological review). Instead, this research assesses the effectiveness of factors influencing the selection of vice (less healthy) and virtue (healthier) products, specifically within the context of vending machines. It analyzes nearly 14,000 real vending machine purchases, offering a more accurate representation of consumer choices.

Second, we are the first to incorporate construal-level theory into retailing studies involving vending machines. This theory helps us to predict and understand how a product's physical placement within the vending machine (e.g., bottom vs. top rows; left vs. right) influences consumers' choices. By utilizing this theoretical perspective, we can examine the psychological aspects of product selection, which represents a significant advancement in understanding consumer behavior within this retailing setting (Study 2).

Third, in Study 3, we leverage the principles of role theory to broaden the perspective and predict how the vending machine's physical location (i.e., the area in which the machine is placed) affects the impact of product familiarity, price, time of day, and payment method on consumers' choices between vice and virtue products. In doing so, we are the first to address the vending machine's physical location, comparing three locations (firms, hospitals, and universities). We are also the first to provide a theoretical framework to predict and interpret how the location will affect consumers' choice of virtue and vice products.

2. Theoretical framework

Consumers categorize foods into vice and virtue alternatives (Dhar and Wertenbroch, 2000), shaping their expectations accordingly. While virtue products offer long-term health benefits, they are less appealing in the short term, whereas vice products provide immediate indulgence but can harm health over time (Van Ittersum et al., 2024). The hedonic goal frame reflects the desire for vice foods, such as chocolate, in contrast to utilitarian goal frames that focus on enhancing personal resources, triggered by healthier choices such as low-sugar drinks or dried fruit snacks (Dhar and Wertenbroch, 2000). Therefore, the consumption of vice and virtue products arises from different motivations: vice products relate to self-reward and cravings for tasty foods (Ketron et al., 2021), often leading to feelings of guilt and regret (Kivetz and Zheng, 2006), while virtue products are consumed primarily to achieve health-related goals (Mishra and Mishra, 2011).

Previous research in contexts other than vending machines has explored several factors that affect consumers' preferences for less healthy (vice) snacks and low-involvement food products compared to healthier (virtue) options. Despite the heterogeneity of these studies, they agree on the potential relevance of product familiarity, price, time of day, and payment method in shaping food choices. The following sections provide a brief overview of these variables.

While it may seem obvious that these factors influence consumer product choices, it is relevant to acknowledge the unique characteristics of the vending machine setting compared to traditional retail environments. Vending machines, with their limited item selection due to space constraints (Hua and Ickovics, 2016) and fully automated purchasing processes, create a distinct shopping experience (Peterson and Balasubramanian, 2002). The need for quick decision-making, the absence of human interaction, and an increased emphasis on convenience define the vending machine context differently from traditional retail settings. These unique aspects suggest that consumer behavior may be influenced differently when using vending machines. Therefore, studying how these factors impact consumer choices within this context is justified and less obvious than it might appear.

2.1. Potential drivers of food choice in vending machines

2.1.1. Product familiarity

Consumers often use product familiarity as a proxy for product-related characteristics, which significantly enhances the likelihood of purchase and drives food selection (Brunstrom et al., 2010). Moreover, familiarity fosters trust and commitment to specific products, facilitating preference and selection (Herrera and Blanco, 2011). A familiar product serves as a more accessible cue in a consumer's memory, increasing the likelihood that past experiences will inform present choices (Giacalone and Jaeger, 2016). In the context of vending machines, where decision-making time is often limited, consumers frequently rely on cognitive shortcuts, such as recalling familiar products, to make quick and efficient selections (Jebarajakirthy et al., 2020; Peterson and Balasubramanian, 2002). Product familiarity therefore emerges as a powerful driver of product choices, particularly in vending machine settings where decisions are made rapidly.

In particular, product familiarity might have a stronger impact on the choice of vice than virtue foods: familiar vice products evoke stronger emotional memories of pleasure and indulgence, often overshadowing associations linked to virtue products (Van Ittersum et al., 2024). Moreover, consumers are motivated by the hedonic benefits of vice products, such as taste and enjoyment, especially when seeking comfort or a treat (Ketron et al., 2021). When familiarity becomes a psychological anchor, drawing consumers to products that satisfy cravings and nostalgia, the emotional connection with food could make vice products more appealing, facilitating consumers' recall of enjoyable experiences,

such as a favorite childhood snack. This preference for familiar vice products may persist even when other alternatives offer health benefits. In addition, when consumers are confident that a product will deliver satisfaction based on past experiences, they are more likely to choose it again. By contrast, virtue products lack the same emotional comfort and indulgent appeal (Carrillo-Álvarez et al., 2020).

2.1.2. Price

Previous research has found that, when faced with the choice between healthier (virtue) and less healthy (vice) products, consumers are often willing to pay up to 20 % more for healthier options. This inclination stems from the perception that purchasing healthier foods optimizes their health and well-being (Dhar and Wertenbroch, 2000; Van Ittersum et al., 2024). In contrast to traditional retail experiences, on-the-go retailers such as vending machines minimize the time spent on decision-making. This reduction in deliberation can lead to more impulsive choices regarding food: impulsivity significantly influences unhealthy food choices, as consumers may opt for vice products without thorough consideration (Kivetz and Zheng, 2006). Many consumers experience guilt when indulging in vice products and often feel the need to justify their choices (Mishra and Mishra, 2011). To solve this conflict, they employ a strategy known as self-rationing, which allows them to enjoy immediate pleasure while preventing overconsumption (Wertenbroch, 1998). Interestingly, after exerting effort to acquire vice goods, consumers often feel entitled to indulge, increasing the likelihood of consumption (Kivetz and Keinan, 2006).

Convenience also plays a crucial role in consumer behavior in relation to vending machines. Research has demonstrated that convenience shoppers tend to be less price-sensitive and more flexible regarding costs due to the urgency of their purchases (Emmelhainz et al., 1991). This trend aligns with the perception of vice products in vending machines as small, well-deserved rewards, which makes higher prices more justifiable (Choi and Park, 2024). In summary, impulsivity, reduced price sensitivity, and the perception of indulgence as a reward provide a compelling rationale for why vending machine users may be more inclined to spend on vice products rather than virtue ones in this unique retail setting. Therefore, a higher price might hinder the choice of virtue products $more than vice.

2.1.3. Time of the day

Several studies have emphasized the role of time of day in shaping food choices (Yang et al., 2022; Thomas et al., 2011). Consumption behavior varies throughout the day, reflecting changing nutritional needs and choices influenced by physiological fluctuations (Poggiogalle et al., 2018). Evidence indicates that individuals consume healthier options in the morning, but gradually shift towards less healthy foods as the day progresses, often culminating in junk food by the evening (Burnham, 2012). This shift can be partially attributed to decision fatigue later in the day, which reduces self-control and impacts health-conscious decision-making (Yang et al., 2022).

A number of studies have identified self-control as the reason behind food choice fluctuations throughout the day, with self-control increasing in the morning but declining by evening (Boland et al., 2013). In addition, preconceived notions about appropriate meal times shape consumer preferences, resulting in increased consumption of unhealthy snacks in the afternoon when indulgence feels more acceptable (Boland et al., 2013). Ultimately, the differences in food choices at different times of day are influenced by a combination of cultural factors, marketing strategies, and the fulfillment of psychological needs (Spence, 2021). Regardless of whether the explanation involves a decrease in self-control during the day or changes in nutritional needs and physiological fluctuations, both views suggest that earlier times of the day should facilitate the choice of healthier foods, while later times may increase the likelihood of choosing vice foods.

2.1.4. Payment method

Consumers who use credit cards or mobile payment options are more likely to buy vice products than those who pay with cash. This phenomenon occurs because non-cash transactions diminish the immediate emotional impact of spending (Thomas et al., 2011). Most research on payment methods and consumer behavior has focused on comparing credit cards to cash. Findings consistently indicate that credit cards lead to increased spending (Liu and Chou, 2020), as they facilitate purchases (Falk et al., 2016), weaken impulse control, and potentially increase the purchase and consumption of vice products (Schomburgk et al., 2024). By contrast, cash payments enhance self-control, giving consumers a greater sense of restraint when selecting healthier options. This increased self-control contrasts with the indulgence and emotionality of buying decisions potentially triggered by vice products. Therefore, consumers might be more inclined to purchase virtue products when paying cash, reinforcing their commitment to healthier options. Contrastingly, they might be more likely to choose vice products when paying by card or app.

In summary, drawing on research in retail contexts other than vending machines, we anticipate that greater product familiarity, higher prices, card payments, and later times of day may encourage consumers to choose vice foods in the case of vending machines. We therefore formulate the following hypothesis.

H1. Consumers are more likely to choose virtue products in vending machines when product familiarity is low (H1a), prices are low (H1b), cash payments are used (H1c), and during the morning hours (H1d).

2.2. A construal-level theory approach to the effects of product layout

To investigate the impact of product layout on consumer choices, previous studies have examined various factors, such as the effects of increasing the distance between offices and snack stations in workplace settings (Baskin et al., 2016), arranging products in order of popularity (Pizzi and Scarpi, 2016), and enhancing the availability of healthier options over less healthy alternatives (Calabro et al., 2024), among other scenarios (for a comprehensive review, see Pizzi and Scarpi, 2016). Most of these studies employ an empirical approach, manipulating product layouts to assess their influence on consumer decisions.

The product layout generally adheres to a grid-like structure defined by horizontal and vertical coordinates, whether on physical shelves, on computer screens, or within vending machines. The literature on retailing has explored the significance of both vertical and horizontal dimensions in planograms, revealing their crucial role in shaping consumer behavior (McCrea et al., 2008; Nussinson et al., 2021). Research indicates that vertical displays tend to result in lower variety-seeking behavior than horizontal displays (Deng et al., 2016) and enhance the willingness to select options associated with long-term benefits (Slepian et al., 2015). In addition, consumers prefer items positioned at the edges of displays rather than those in the center (Pizzi and Scarpi, 2016).

The psychology literature has also addressed horizontal and vertical dimensions in relation to space. Specifically, the construal level theory (Trope and Liberman, 2010) is a psychological framework that explores how the psychological distance of objects influences individuals' thinking about them. It suggests that the further away something is, the more abstract and generalized one's thinking becomes. Conversely, individuals are more likely to engage in concrete and detailed thinking when something is perceived as closer. In line with this, Van Kerckhove et al. (2015) demonstrated that consumers perceive top items as closer and bottom items as further away.

Construal level theory extends to the horizontal and vertical dimensions of space, suggesting that verticality can affect cognitive processes (Slepian et al., 2015). For example, higher positions may evoke elevation and abstract thinking, leading individuals to prioritize long-term goals and broader perspectives and make more rational choices. By contrast, lower positions encourage a focus on immediate

rewards and practical considerations (McCrea et al., 2008; Nussinson et al., 2021) and favor more emotion-driven choices (Cian et al., 2015). Similarly, other scholars in psychology have focused on the horizontal dimensions, demonstrating that high construal conditions are associated with left-to-right representations. By contrast, low construal conditions are associated with right-to-left representations (Suitner and Giacomantonio, 2012). Moreover, research indicates that individuals often mentally or visually position the "actor" on the left side rather than the right when engaging in abstract, big-picture thinking. This tendency arises from the activation of cognitive schemas that prioritize general patterns and conventions, such as the culturally ingrained habit in most countries of reading from left to right (Suitner and Giacomantonio, 2012). In summary, research based on construal-level theory has provided extensive evidence of a connection between high construal and top-left spatial representations and between low construal and bottom-right spatial representations.

Building on these considerations, we apply the perspective of construal-level theory to vending machines for the first time. Just as in other retail environments, vending machines incorporate both vertical and horizontal dimensions, creating opportunities for consumer interaction that align with the tenets of construal-level theory. In vending machines, products are arranged in a grid-like structure, with items displayed at varying heights and positions, allowing for distinctions between high and low, left and right. This spatial organization can influence consumer perceptions and decisions consistent with the theoretical framework of construal-level theory.

Consequently, we suggest that vice foods, characterized by their impulsive, short-term indulgence goals, align more closely with lower construal levels. They should therefore benefit from being placed in the lower areas of vending machines, as these placements naturally encourage consumers to focus on immediate rewards and practical considerations (McCrea et al., 2008; Nussinson et al., 2021), while favoring more emotion-driven choices (Cian et al., 2015). Moreover, placing vice products on the right side of the vending machine should further complement this strategy. Right-side positioning is often associated with concrete thinking and immediate decision-making, which aligns with the nature of vice foods as quick, satisfying options. Conversely, we advance that virtue products, associated with long-term health benefits and self-control, fit better with higher construal levels. They should therefore be placed in higher and leftward positions within the vending machine.

We therefore hypothesize as follows.

H2. The impact of low (high) familiarity, low (high) prices, cash (card) payments, and morning (evening) hours on the likelihood of choosing virtue (vice) products is amplified by a top-left (bottom-right) layout.

2.3. A role theory approach to the location effects of vending machines

According to role theory, individuals inhabit various roles that shape their behavior, self-perception, and the perceptions others have of them (Anglin et al., 2022). Consequently, individual behavior can be effectively understood and predicted by recognizing individuals' roles and the behavioral expectations associated with those roles (Tubre and Collins, 2000). Previous studies have identified various roles that impose these expectations, including gender roles (Badura et al., 2018) and professional roles (Livingston, 2011). Recent advancements in role theory suggest that location can also influence behavior, as specific locations are often linked to particular social norms (Breuning, 2022). We apply these insights from psychology and sociology to retailing and decision-making, proposing that the location of a vending machine can influence consumers' choices between virtue and vice food options. Behavioral expectations associated with social roles and environmental contexts affect individual decision-making processes. For example, a vending machine located in a gym may trigger expectations of health-conscious behavior, motivating individuals to opt for healthier choices. Conversely, a vending machine in a recreational setting, such as a movie theater, may prompt indulgent choices due to the social norms associated with that environment. The location of a vending machine can create social cues that steer individuals towards healthier or unhealthier food selections, reflecting the behavioral expectations linked to their immediate surroundings. Previous studies have demonstrated that behavioral expectations also affect eating behavior, influencing choices between vice and virtue options (e.g., Dhar and Wertenbroch, 2000; Van Ittersum et al., 2024).

Reports from practitioners and sales analyses identify three primary locations where vending machines are commonly found: workplaces, universities/schools, and hospitals (Nayax, 2024). These settings are particularly relevant from a theoretical standpoint, as they embody distinct social norms and behavioral expectations, providing unique cues that can influence individual behavior. According to role theory, these variations in location can significantly affect how individuals make food choices, as the associated social roles and expectations may guide decision-making processes in different ways. These three primary locations are examined below.

Hospital locations: Patients and healthcare workers often experience heightened stress, leading them to seek comfort through food (Marko et al., 2023), a trend particularly relevant for hospital staff, who have limited meal times. Due to the intense demands of their jobs, medical personnel often resort to unhealthy eating behaviors as a coping mechanism for stress (Wills and Kelly, 2017; Monaghan et al., 2017). Many struggle to maintain healthy habits, prioritizing responsibilities over nutrition (Marko et al., 2023). Inadequate food storage and preparation facilities increase reliance on vending machines for quick meal options (Brogan et al., 2021). Product familiarity can lead to a stronger preference for vice products in this environment. The emotional needs of hospital workers and limited food options make familiar indulgent snacks appealing during stressful times. Research has identified guilt-reducing mechanisms, such as helping others, can heighten the preference for less healthy products (Khan and Dhar, 2006). As caregivers face role pressures, the urgency of their food purchases reduces price sensitivity (Swoboda and Morschett, 2001), prompting them to favor familiar foods that evoke positive emotions to counteract stress and mental overload (Ketron et al., 2021). Family caregivers experiencing similar stress while caring for loved ones in hospitals will likely choose indulgent snacks for comfort (Carroll et al., 2020). These factors suggest that product familiarity in hospitals increases the likelihood of selecting vice products as individuals seek relief from challenging circumstances. Therefore, we propose that the hospital context, which is characterized by stress and emotional demands, reinforces the tendency to gravitate towards familiar indulgent options, intensifying the impact of product familiarity on food choices and overriding the impact of price.

University/school locations. Universities and schools are environments where previous studies have identified a prevalence of stressors from academic, social, and financial pressures (Leguizamo et al., 2021). This combination often leads to heightened anxiety (Dyson and Renk, 2006) and affects not only students but also faculty and staff (Evans et al., 2018). Students and faculty may engage in self-indulgent behaviors in response to this stress. Students pressured to achieve high grades and meet deadlines may turn to comfort foods for escapism (Clohessy et al., 2019). Research has demonstrated that stressful situations often lead consumers to indulge in vice products (Lunardo et al., 2022; Vosgerau et al., 2019). Feelings of lack of control in such environments can increase emotional engagement, resulting in vice snacks being chosen more frequently (Ketron et al., 2021; Miller and Effron, 2010). Therefore, the university environment and the significant stressors students face support the hypothesis that this setting enhances the positive relationship between product familiarity and the choice of vice products. Familiarity with these indulgent options provides comfort amid academic challenges, strengthening the connection between product familiarity and vice product choice.

Business locations: While stress is present in business contexts, psychological scholars suggest that the social nature of interactions prevails in these settings. In business settings, individuals are often concerned about being judged for their choices, especially since those choices are visible and subject to evaluation by others. This concern can have a greater impact on their behavior than stress alone. Research indicates that individuals tend to adapt their eating habits to fit the norms set by their peers (Engell et al., 1996), and social norms can encourage healthy eating behaviors (Spence, 2021). In business settings, lunch and coffee breaks are communal moments where people meet and share meals, increasing the influence of social norms compared to other environments. In addition, vending machines are typically available to employees who prefer them over other food outlets (Grech and Allman-Farinelli, 2015). Given this context, it is reasonable to suggest that while product familiarity usually results in a preference for vice products, this effect may be less pronounced when the vending machine is located in a business setting. The presence of social norms and the desire to adhere to healthier eating habits in a shared environment could potentially lessen the impact of product familiarity on food choices. Furthermore, the urgency of employees' schedules and the social dynamics at play may overshadow price considerations, leading individuals to prioritize familiar and socially acceptable choices over cost, especially when making quick decisions during breaks, as place and social norms matter more than price in these environments (Law et al., 2022).

In summary, we propose that the physical location of vending machines significantly influences consumers' choices between virtue and vice foods. In hospital settings, and to a lesser extent in universities and schools, individuals are more likely to indulge in less healthy options due to the stress associated with their environments. This heightened emotional strain diminishes the emphasis on convenience while simultaneously elevating the role of product familiarity in their food selections. Conversely, in business contexts, we propose that food choices are predominantly shaped by social influences, which increase the likelihood of opting for healthier options as individuals seek to avoid negative judgments from peers. In these environments, the focus shifts away from convenience and reduces the impact of product familiarity, as the desire to conform to social norms takes precedence over personal preferences.

Finally, the form of payment and the time of day fall outside the tenets of role theory. Consequently, in Hypothesis 3 (H3), we focus solely on product familiarity. We therefore hypothesize as follows.

H3. A vending machine's location moderates the impact of product familiarity on vice product choice. Specifically, the effect is strongest in hospitals, followed by universities/schools, and weakest in business settings.

3. Study 1

Study 1 explores the effects of product familiarity, price, time of day, and payment method (cash vs digital) on product choice. Specifically, it tests the hypothesis that consumers are more likely to select virtue products in vending machines when product familiarity is low (H1a), prices are low (H1b), cash payments are used (H1c), and during morning hours (H1d).

3.1. Method and results

3.1.1. Sample

Telemetry is a technology that is used to collect and transmit data from vending machines. It allows operators to monitor vending machines remotely, providing real-time insights into how the machines are performing and which products are being sold. Vending machine operators can use telemetry to track metrics such as which items are selling and when the machine needs restocking. This information helps optimize inventory management, improve product placement, and enhance operational efficiency.

We used a dataset of 13,709 transaction records for 121 products obtained from vending machine telemetry, covering seven vending machines from December 2021 to April 2022. Each transaction represents a single product purchased by a customer. The dataset was obtained from a leading EU firm specializing in tracking technology for consumer behavior in retail settings.

The minimum sample size calculated for a power of 0.80 is 36. We used 13,709 observations, leading to a sample power of 1 (maximum).

3.1.2. Measurement

The telemetric data automatically recorded for each transaction includes the product's EAN (European Article Number), description, date and time of purchase, price, payment method, and its specific placement within the vending machine (row and column). Payment methods were classified into cash, cards, and mobile payments, as done by Bechler et al. (2023). For mobile payments, we included systems such as Google Pay, Samsung Pay, and Apple Pay, following Ma et al. (2024).

To categorize the time of purchase, we relied on research that identified morning, afternoon, and evening as key periods for food choices (Boland et al., 2013). However, vending machines are also accessible during times when other retailers may be closed (e.g., at night) or unavailable (e.g., when one cannot leave work to drive to a store for a snack; Grech and Allman-Farinelli, 2015; Matthews and Horacek, 2015). Therefore, we broadened our classification and split the time of purchase into five slots to provide a more accurate representation of time: 7–11 a.m. (morning), 11 a.m. to 3 p.m. (noon), 3–6 p.m. (afternoon), 6 p.m. to 12 a.m. (evening), and 12 to 7 a.m. (night).

Next, to measure product familiarity and the extent to which the items chosen were regarded as virtue or vice products, we utilized SurveyMonkey to gather responses from 130 online respondents who were representative of the target market (with a mean age of 32 years and 50 % women). Each participant evaluated 20 products that were randomly assigned from the 121 options available in the vending machines. An image was provided for each product, and respondents assessed product familiarity using a single-item 5-point scale. Next, they read the definitions of vice and virtue products from Carrillo-Álvarez et al. (2020) and rated the products on a bipolar scale from completely vice (1) to completely virtue (5). While older studies viewed virtue and vice as mutually exclusive (Van Doorn and Verhoef, 2011), we align with more recent literature suggesting they exist along a spectrum, enabling nuanced ratings that capture varying degrees of virtue (Londoño and De Maya, 2022; Ketron et al., 2021).

3.1.3. Procedure

The prediction of the vice–virtue choice was framed as a regression task, with the vice-virtue score of the selected product(s) serving as the dependent variable. The dataset was standardized, and duplicates were removed to ensure data quality and integrity. The model features included time slot and payment method as categorical variables, while familiarity and price were treated as numerical variables. To identify the best-performing regression model, we utilized AutoGluon, an automated machine-learning toolkit that evaluates various models and hyperparameters to identify the optimal solution (Erickson et al., 2020). AutoGluon streamlined the model selection process by efficiently assessing multiple models and configurations. We utilized a train-test split with a 0.25 holdout fraction and extracted a validation set with a 0.1 holdout fraction for hyperparameter tuning (Goodfellow et al., 2016). To enhance the interpretability of our analysis, we calculated feature importance for the best model using permutation importance. This approach assesses the relative significance of each input feature in predicting the target variable, allowing us to evaluate each feature's contribution to the model's predictive power, thereby improving the transparency and explainability of our results. Permutation importance is a robust and model-agnostic method, as it involves shuffling the values of each feature and measuring the resulting decrease in model

performance (Breiman, 2001).

3.2. Results

Different regression models were compared to maximize the coefficient of determination (R^2). The results are presented in Table 1. The top-performing model was KNeighborsDist, which utilizes a regression approach based on k-nearest neighbors, applying a weight function that considers distance. It assigns weights to points inversely proportional to their distance from the query point so that neighbors closer to the query point exert a greater influence on the prediction than those further away.

Additional metrics for the best model include RMSE: 0.1859, MSE: 0.0345, and MAE: 0.0395. Feature importance related to R^2 is reported in Table 2, which presents the calculated feature importance scores, their standard deviations, and *p*-values. The *p*-values are derived from a *t*-test that evaluates the null hypothesis that the importance equals zero against the alternative hypothesis that it is greater than 0. Table 2 indicates that neither the time slot nor the payment method is statistically significant, while familiarity and price emerge as the most significant features. The adjusted R^2 for the best model was calculated to be 0.97956, which is very close to the R^2 value (0.97958). Both values are near 1.0, signifying a strong correlation between the predicted and observed values.

After identifying the optimal regression model for predicting the dependent variable, we further investigated the role of product familiarity, price, payment method, and time of purchase to understand their impact on the likelihood of choosing virtue products. To do this, we fitted a simpler linear regression model and analyzed the regressor coefficients to interpret each predictor's contribution more accurately. Our findings reveal that price and familiarity negatively affect the choice of virtue products, with coefficients of −0.66 and −0.17, respectively. This suggests that higher prices and increased familiarity are associated with lower scores, leaning towards vice products as predicted in H1 and H1b. However, neither payment methods (H1c) nor the time of purchase (H1c) influenced vice–virtue product choices in vending machines. Consequently, H1 is only partially confirmed.

4. Study 2

Study 2 examined the moderating role of physical product placement within vending machines, as advanced by H2. Specifically, it suggested that placing products top-left (bottom-right) enhances the likelihood of virtue (vice) choices.

4.1. Method and results

4.1.1. Sample and procedure

Study 2 utilized the dataset of 13,709 transaction records for 121 different products in seven vending machines as used in Study 1, but accounted for the row and column that the products occupied in the vending machine. Again, the dependent variable was the virtue or vice score of the chosen product, and the data were actual consumer transactions. Using Hayes' PROCESS macro for SPSS with 5000 bootstraps and normalized column and row data, we tested how the row and the column moderated the impact of price and familiarity on consumers' food choices.

Table 1
Comparison of models.

Model	R^2	Model	R^2
Kneighborsdist	0.9803	Lightgbm	0.9716
Weightedensemble_l2	0.9795	Extratreesmse	0.9444
Lightgbmlarge	0.9791	Catboost	0.9431
Randomforestmse	0.9790	Lightgbmxt	0.8732
Kneighborsunif	0.9789	Neuralnetfastai	0.7130
xgboost	0.9777	Neuralnettorch	0.6390

Table 2
Feature importance.

Feature	Importance[a]	SD	*P*-value
Familiarity	1.6803	0.03262	<0.05
Price	0.6146	0.0194	<0.05
Payment method	0.0019	0.0022	>0.05
Time slot	−0.0001	0.0002	>0.05

[a] Feature's contribution to the model's predictive power (Breiman, 2001).

4.2. Results

Accounting also for the row and column demonstrated that price was no longer significant in predicting the choice of a vice or virtue foods (B = 0.019, SE = 0.001, $p = .068$), while familiarity remained significant and negative (B = 0.658, SE = 0.030, $p < .001$), meaning that familiarity increases the likelihood of purchasing a vice product. Furthermore, the impact of familiarity was significantly moderated by the row (B = 0.729, SE = 0.034, $p < .001$) and the column (B = 0.071, SE = 0.034, $p = .035$).

As further confirmed by the PROCESS test of highest order unconditional interactions on the price–choice relationship, the row had a 10-fold stronger moderation than the column (R^2-change for Row = 0.014, F = 456.549, $p < .001$ vs. R^2-change for Column = 0.001, F = 4.426, p = .035). This evidence means that although the row and the column influence the familiarity–choice relationship, the row is a much more powerful effector.

Observing the conditional effects at the values of the moderator revealed that the row counteracted the familiarity–choice relationship by −0.419 (SE = 0.013, $p < .001$) when the product was placed on the top. As the product moved downwards, the effect became +0.038 (SE = 0.015, $p < .001$). The reversal in sign means that the top-bottom product placement weakens the impact of familiarity on product choice in the top rows and enhances it in the bottom rows. In other words, virtue products benefit from being placed on top, as the negative impact of high familiarity is weakened, while vice products benefit from being placed at the bottom. Furthermore, the data revealed a significant direct effect of the row on the probability of choosing a virtue product. Specifically, moving vertically upwards in the vending machine favors the choice of a virtue product (B = 1.558, SE = 0.168, $p < .001$).

Regarding the column (i.e., left vs. right), the conditional effects at the values of the moderator revealed that, as products move from right to left, the negative impact of familiarity on virtue choice became weaker: the column's effect went from −0.218 (SE = 0.020, $p < .001$) to −0.040 (SE = 0.019, $p = .036$). In other words, virtue products are advantaged by being placed on the right, while the left-hand side favors vice products.

Overall, H2 is only partially supported, as familiarity is identified as the sole direct predictor of product choice. However, the hypothesis receives full support regarding the influence of layout, with the top-left arrangement significantly favoring virtue products and the bottom-right layout enhancing the appeal of vice products.

5. Study 3

Study 3 investigated the moderating role of vending machine location on product choice, focusing on how differences based on role theory across settings affect consumers' food choices. It tested hypothesis (H3), namely that the impact of product familiarity on the likelihood of choosing vice products is amplified by certain locations (hospitals and universities/schools) and weakened by others (businesses).

5.1. Method and results

5.1.1. Sample and procedure

Study 3 used 13,709 transaction records for 121 products and seven vending machines, as used in Studies 1 and 2, but accounted for the vending machines' location. Again, the dependent variable was the vice–virtue score of the chosen product, and the data were actual consumer transactions. Using Hayes' PROCESS macro for SPSS with 5000 bootstraps, we tested how the vending machine's location moderates price and familiarity with the dependent variable.

The vending machines were located in hospitals, firms, and universities, accounting for 1296 (9.5 %), 7515 (54.8 %), and 4898 (35.7 %), respectively, of the 13,709 transaction records. The products sold in each location were the same. These proportions of transactions in each location are typical and reflect expected patterns in consumer behavior. Furthermore, the distribution of vending machines across these locations – one in hospitals, four in firms, and two in universities – is representative and aligns with common trends in vending machine placement for the firm running the telemetric data surveillance.

5.2. Results

Accounting for the vending machine's location revealed that price ($B = -0.03$, $SE = 0.001$, $p < .001$) and product familiarity ($B = -0.705$, $SE = 0.034$, $p < .001$) negatively affected the choice of a virtue product. The negative coefficient sign meant that the probability of choosing a virtue product was reduced, while that of choosing a vice product was enhanced. As anticipated by H3, location significantly moderated the impact of familiarity ($B = 0.252$, $SE = 0.014$, $p < .001$). The moderation effect on price was negligible ($B = 0.003$, $SE = 0.000$) and insignificant.

The PROCESS test of highest-order unconditional interactions on the familiarity–choice relationship revealed a significant R^2 change ($F = 330.671$, $p < .001$). The conditional effects of the focal predictor at the values of the moderator (location) demonstrate that the impact of location is as outlined in H3. Specifically, familiarity leads even more vice products being chosen when the vending machines are placed in hospitals ($B = 0.145$, $SE = 0.041$, $p < .001$), followed by universities/schools ($B = 0.118$, $SE = 0.028$, $p < .001$). However, contrary to our expectations in H3, the effect in business contexts is weaker and even negative ($B = -0.297$, $SE = 0.014$, $p < .001$). As expected, no moderation effect by location emerged for any other predictors considered in Study 1 (price, payment form, and timing).

6. General discussion

This study has explored the factors that influence consumer choices between virtue and vice products in vending machines. Our findings provide new insights into how product familiarity, price, placement, location, and positioning (row and column) influence these choices. Despite the limited number of studies focusing on vending machine contexts, the literature acknowledges that this unique setting may lead to different consumer decisions compared to traditional retail environments, both offline and online. Our research contributes to the literature by presenting findings specific to vending machines, addressing a notable gap. In addition, while many existing studies rely on self-report data (Grimmer and Miles, 2016) or experimental scenarios with few participants, our research is based on thousands of actual, real-life transactions. Our findings pave the way for a deeper understanding of consumer behavior in vending machine settings. Specifically, they highlight that product familiarity and price drive consumer preferences for vice products in vending machine contexts, consistent with other retail settings (Choi and Park, 2024). However, the anticipated effects of time of day and payment method, typically observed in traditional retail environments, did not significantly influence consumer choices in vending machines. Since vending machines are operational 24/7, consumers have the flexibility to make purchases at any time. The typical time-of-day effects observed in traditional retail settings, where shopping behavior is influenced by store hours and meal times (Yang et al., 2022), may be less pronounced due to this constant availability. For example, conventional retail research has demonstrated that consumers tend to choose healthier options in the morning and more indulgent ones in the evening (Boland et al., 2013). Nevertheless, the unique accessibility of vending machines could disrupt these patterns.

Previous studies have highlighted how the acceptability and appropriateness of various foods vary according to the meal context, especially for breakfast, lunch, and dinner, which are generally considered the main meals of the day (Jaeger et al., 2019). Nonetheless, given that vending machines provide mainly snack foods, what is considered suitable during mealtimes becomes less defined. This explains why the time of the day does not affect which food option is chosen. Finally, compared to meals that usually adhere to social norms (Spence, 2021), vending snacks do not correspond to designated eating times. This lack of structure may account for the inapplicability of time-based eating logic. Vending machines are frequently utilized outside conventional mealtimes, leading to a more uniform daily consumption pattern.

Furthermore, a recent meta-analysis (Schomburgk et al., 2024) suggests that cashless payment formats have a small but significant impact on consumer choices across retail settings. However, this effect diminishes for non-conspicuous consumption. While vending machines were not included in their analysis, our findings are consistent with their conclusions, as vending typically reflects non-conspicuous consumption (Jebarajakirthy et al., 2020; Peterson and Balasubramanian, 2002). The meta-analysis also shows that the cashless effect has declined over time, likely due to growing consumer familiarity with digital payments. This helps explain why the payment method was insignificant in our vending machine transaction data.

By applying the principles of construal-level theory to the vending machine context, our findings emphasize the importance of strategically planning the layout of the machine's products. Placing virtue products in the upper rows or on the right-hand side of the display significantly increases their chances of being selected. This finding not only contributes to the body of retail research on shelf layout and planogram development (see Pizzi and Scarpi, 2016, for a review), but also provides a theoretical framework for predicting and understanding how and why the placement of virtue and vice products in different rows and columns affects consumer choices.

Finally, for the first time in retail studies, our results broaden the perspective of vending machine studies by adopting the role-theory perspective. We predict how the physical location of vending machines – in firms, hospitals, and universities – affects the influence of product familiarity, price, time of day, and payment method on consumer choices between vice and virtue products. Specifically, when comparing these three popular locations for vending machines, our findings are the first to demonstrate that high-stress environments such as hospitals and universities lead to increased purchases of vice products. This aligns with the notion of emotional overload and the desire for immediate comfort or indulgence. Conversely, in business contexts, the selection of virtue products is often influenced by social norms and professional expectations. Employees may feel a stronger inclination to make choices that align with perceived standards of healthy behavior, especially in settings where their choices are visible to their peers. These findings underscore the significance of customizing vending machine strategies to suit the unique characteristics of their locations, as consumer priorities and behaviors can differ greatly across environments. Moreover, these findings are consistent with the principles of role theory, which emphasize how contextual factors can impact consumer behavior in retail settings.

In conclusion, this study sheds light on the factors that influence consumer choices between virtue and vice products in vending machines, highlighting the significance of product familiarity, price, product placement, and location. Our research addresses a gap in the current literature by utilizing real-life transaction data and applying

theoretical frameworks such as construal-level theory and role theory. It offers practical insights for optimizing vending machine strategies, as discussed in the next section. Ultimately, this research enhances our understanding of consumer behavior in vending machine settings, laying the groundwork for future research, which we discuss in the following sections.

Given the alarming statistics that approximately 2.5 billion adults are overweight (World Health Organization: WHO, 2024), which poses serious health risks and results in significant healthcare costs (Van Tulleken, 2023), the findings of this study offer actionable insights for vending machine operators, retailers, and policymakers who are eager to promote healthier eating habits and optimize sales strategies.

7. Managerial implications

First, the critical role of product placement in promoting the choice of virtue products underscores the necessity for smarter and more deliberate planograms. By placing healthier options in the top rows or on the right-hand side of vending machine displays, operators can capitalize on consumer tendencies towards abstract, goal-oriented thinking, facilitating better choices. Retailers should prioritize these strategic layouts, particularly in environments where health-conscious decision-making is encouraged, such as workplaces and schools.

Second, the influence of product familiarity emphasizes the importance of offering recognizable products that inspire consumer trust. Collaborating with well-known brands to introduce healthier versions of popular vice products can help drive sales while subtly shifting demand towards virtue products. Point-of-purchase communication, such as highlighting familiar brands through interactive screens or promotional banners, can further reinforce consumer confidence and simplify decision-making, which is crucial in fast-paced environments. Moreover, pricing strategies play a critical role in shaping consumer behavior in relation to vending machines. Price has a significant impact on product choices, so implementing targeted pricing strategies, such as discounts on healthier options or healthy bundles, can effectively steer consumers towards healthier choices. These strategies may be especially important in workplace settings, where frequent purchases make consumers more sensitive to prices. In high-stress environments such as hospitals and universities, promotional efforts should focus on making it easier for consumers to choose healthier options, such as offering bundled discounts or loyalty rewards for selecting virtue products.

Finally, vending machine operators should utilize technological advancements, such as smart machines with dynamic pricing and personalized recommendations, to develop adaptive interventions customized to individual consumer contexts. For example, interactive screens could provide real-time feedback or gamified incentives, incentivizing consumers to select healthier options. Moreover, targeted marketing campaigns tailored to specific locations, promoting products as “brain food” in universities or “energy boosters” in workplaces, could better meet consumer demands and increase both profits and well-being. By adopting these strategies, retailers and vending machine operators could enhance the consumer experience, promote healthier eating habits, and optimize sales performance.

8. Public policy implications

Our results also indicate significant implications for public health policy. Vending machine interventions could be utilized as scalable tools to promote healthier eating habits, which policymakers could leverage to improve dietary outcomes. For example, the finding that product placement and pricing impact food choices supports the implementation of behavioral “nudges,” such as regulations mandating that healthier options be positioned in the top-right areas of vending machines. These modifications could promote healthier choices in environments where decision-making is limited.

Public institutions, such as hospitals and schools, serve as excellent focal points for these policies. It may be necessary to enact legislation mandating a minimum quota of virtue products in vending machines within these settings, as well as implementing front-of-pack nutritional labeling indicators. These standards would be in line with broader public health goals, building upon past successes in school meal programs and sugar tax initiatives.

Furthermore, vending operators who choose to adhere to nutritional standards or implement dynamic pricing strategies that encourage healthier choices could be eligible for financial incentives, such as tax deductions or subsidies. These incentives would help promote healthier options and reduce the possibility of financial disincentives for suppliers.

Finally, policymakers could endorse the incorporation of digital transparency tools into vending machines. Elements such as QR codes with nutritional details or digital reminders that present healthy snacks as beneficial for performance (for example, for students or those working night shifts) could enhance consumer empowerment and strengthen public health communications. These measures would align with the increasing consumer comfort with digital touchpoints and the growing demand for transparency in food environments.

9. Limitations and future research

Our study acknowledges limitations that could be addressed in future research. First, we did not consider personal factors such as stress or workload, which are likely to influence choices made at vending machines and may vary across different settings, such as workplaces and hospitals. Future research should investigate these variables to gain a deeper understanding of their impact on vending machine behavior. In addition, while our analysis utilized real consumer purchase data, it did not have access to demographic factors such as age and gender, which may influence food choices. Exploring generational and demographic differences in vending machine usage could yield valuable insights.

Finally, we would welcome future studies that address cross-cultural comparisons in vending machine food choices, as eating behavior is shaped by culture (Higgs and Thomas, 2016). Our research draws on data from Italy, which may limit the generalizability of our findings. Specifically, Mediterranean cultures such as in Italy, Spain, and Greece are renowned for prioritizing plant-based foods over ultra-processed foods (Obeid et al., 2022). In these contexts, eating snacks from vending machines can be viewed more as indulgent or convenience-driven rather than an everyday food choice. However, perceptions and food choices from vending machines may differ strikingly in countries such as Japan, where vending machines are part and parcel of daily life and regularly offer fresh meals (Nayax, 2024). On the other hand, the typical American consumer eats sweet and salty snacks so frequently that they constitute 58 % of their diet (Cummings and Tomiyama, 2019). Therefore, food choices in this context may be more reflective of habitual snack consumption patterns rather than situational decision-making. Furthermore, socioeconomic factors and government regulations shape product availability in countries with stricter sugar and calorie content policies (Carrillo-Álvarez et al., 2020), such as Belgium, Scandinavian countries, and Australia. Therefore, price sensitivity may be less influential in contexts where health-conscious policies and food labeling are more prominent (Talati et al., 2019; Van Den Akker et al., 2022).

CRediT authorship contribution statement

Agnese Perfetti: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Rocco Pietrini:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data

curation, Conceptualization. **Daniele Scarpi:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Giacomo Gistri:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

N	Product	Product familiarity	Vice-Virtue Rating
1	Ferrarelle water	4,56	4,52
2	Sanbenedetto sparkling water	4,69	4,38
3	Monte Cimone sparkling water	2,85	4,33
4	Natural Monte Cimone water	2,27	4,73
5	Sanbenedetto natural water	4,78	4,96
6	Air Action Vigorsol	4,63	2,9
7	Peanuts Mister Nut	2,36	2,44
8	Orangeade Sanpellegrino	4,29	2,03
9	Mulino Bianco Baiocchi	4,74	1,91
10	Be kind with dark chocolate and salted almonds	2,38	3,07
11	Be kind, almonds and coconut	2,74	3,53
12	Grisbi chocolate biscuits	4,5	1,46
13	Bon Fruit flavour mix Fruit-Tella	2,65	4,03
14	Bounty	4,5	1,38
15	Buoni Così Galbusera	3,57	3,26
16	Cereal Yo - Vitasnella	3,74	3,13
17	Chinò Sanpellegrino	3,93	1,86
18	Chips rustic Salati Preziosi	3,69	1,65
19	Coca Cola	5	1,33
20	Coca Cola Zero	4,87	2,26
21	Crunchy Scotti	2,78	3,03
22	Bacon-flavoured crispy treats	3,65	1,7
23	Pizza crispy treats	3,97	2,17
24	Croccantelle with ham	3,86	1,82
25	Bauli Apricot Croissant	4,09	1,87
26	Bauli Croissant 7 cereals and seeds	3,9	2,38
27	Bauli Chocolate Croissant	4,29	1,79
28	Tart falcone Apricot and Peach	1,89	1,79
29	Tart Falcone Gianduia	2,5	2,22
30	Crostatina Cacao Germinal Bio	3,04	2,56
31	Lively Golden Crostini San Carlo	4,79	2,37
32	Red Orange Derby	2,74	2,35
33	Doricream cacao Doria	3,35	1,8
34	Duplo	4,61	1,61
35	Energade orange	3,77	2,31
36	Energade red orange	3,92	2,96
37	Energade lemon	3,76	2,24
38	Estathé lemon	4,88	2
39	Estathé peach	4,72	1,83
40	Fanta	4,77	1,52
41	Fiesta	4,9	1,45
42	Fonzies cheese	4,5	1,46
43	Fragrantini Fiorentini	3	2,61
44	Fiorentini organic cornflakes	3,76	3,92
45	Gatorade orange	4,29	2,67
46	Gatorade lemon	4	2,52
47	Scotti rice gems	3,68	2,9
48	Gran Pavesi Cracker tomato and cheese	4,16	2,9
49	Kellog Special K dark chocolate	4,29	3,07
50	Kinder Bueno	4,95	1,35
51	Kinder bueno white	4,64	1,29
52	Kinder Cereals	4,95	1,5
53	Kinder délice	4,74	1,3
54	Kinder milk slice	4,96	1,89
55	Kinder Maxi King	3,81	1,28
56	Kinder pingui chocolate	4,62	1,71
57	Kinder pingui coconut	4,5	1,75
58	KitKat	4,88	1,46
59	Levissima sparkling water	4,5	4,54
60	Levissima still water	4,64	4,76
61	Loacker Chocolate	4,75	2,03
62	Loacker Napolitaner	4,71	1,81
63	m&m's	4,91	1,32

(*continued on next page*)

(*continued*)

N	Product	Product familiarity	Vice-Virtue Rating
64	Mikado	4,58	1,69
65	Milka cookie sensation	3,75	1,5
66	Milka Oreo	4,04	1,29
67	Falcone Yoghurt Muffin	2,4	2,36
68	Falcone Yoghurt Plumcake	2,14	2,18
69	Nic Nac's	2,85	1,67
70	Nutella bread	4,21	1,25
71	ORO Ciok	4,75	1,79
72	Viva la mamma, raw ham and cheese sandwich	2,48	2,78
73	Viva la mamma Salami sandwich	2,92	1,92
74	Paquita Crock Canyon	2,83	1,87
75	Patastick PATA	3	1,52
76	Classic potato PATA	3,91	1,59
77	Pepsi	4,63	1,26
78	Pipas artesana	1,97	3,31
79	Red Bull	4,3	1,3
80	Red Bull ZERO	4,16	1,84
81	Ringo vanilla Pavesi	4,73	1,57
82	Rulade milk	2,18	1,61
83	Rulade hazelnut	2,22	1,48
84	SalaMini taralli and Beretta salami snacks	3,76	1,94
85	Sanpellegrini non-alcoholic cocktail	3,63	2,12
86	Schiacciatella tomato and oregano	3,11	2,77
87	Schiacciatelle Olives	3,04	2,69
88	Schiacciatelle Rosemary	3,46	2,85
89	Orange Schweppes	3,88	1,71
90	Schweppes lemon	4,28	1,78
91	Snack parmareggio Snack & Go	3,37	3,22
92	Special K Red fruits	4,1	3,48
93	Student mix peanuts FOX	2,48	4,26
94	ACE Derby sugar-free juice	3,44	3,68
95	Juice AQ purple Yoga	3,04	3,64
96	Juice Red Orange Derby sugar-free	3,67	3,53
97	Santal Big Pear Juice	3,61	3,39
98	Santal Peach-Lemon Juice	4,16	2,6
99	Juice Peach/Mango Yoga	3,7	2,91
100	Valfrutta Apricot Juice	4,61	3,06
101	Valfrutta Pear Juice	4,2	3,15
102	Valfrutta Peach Juice	4,49	2,95
103	Juice Yoga 100 % Orange Juice	3,71	4
104	ACE Yoga Juice	4,39	3,58
105	Red Orange Yoga Juice	3,57	3,48
106	Juicy ZERO Mixed Fruits SAN BENEDETTO	3,77	3,45
107	Succoso ZERO San benedetto red fruits mix	3,86	3,86
108	Tarallino snack Natur Puglia	2,95	3,38
109	San Benedetto Lemon Tea	4,45	2,6
110	San Benedetto Lemon Tea ZERO sugar	3,97	2,97
111	San Benedetto peach tea	4,23	2,35
112	Green tea San Benedetto	4,19	3,26
113	Tramezzino Viva la mamma Beretta cooked ham and artichokes	3,27	2,62
114	Tramezzino Viva la mamma Beretta tuna and tomato	2,84	2,72
115	TUC pocket	4,43	2,3
116	Twix	4,78	1,3
117	Vivident blast fresh	4,29	2,71
118	Grisbi chocolate wafers	3,44	1,78
119	Matilde Vicenzi chocolate wafers	3,13	1,84
120	Grisbi vanilla wafers	3,7	1,78
121	Yovi banana bar	2,5	3,7

Data availability

The data that has been used is confidential.

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